GREATNESS STEMS FROM IOWANS

GOVERNOR'S STEM ADVISORY COUNCIL

2016-2017
Iowa STEM Evaluation Report

"Across Iowa, businesses, schools, developers and government are coming together to build a new home for innovation in America's heartland. We see that commitment in Iowa's education system and in the value that you place on creativity, adaptability and new ways of thinking . . . we admire what you guys have accomplished, and we want to be a part of it."

- Tim Cook, CEO, Apple Inc.

Source: PC Magazine: Apple commits $1.3B for Iowa data center
http://in.pcmag.com/news/116380/apple-commits-13b-for-iowa-data-center?utm_medium=email&utm_source=govdelivery

KEY INDICATORS

These indicators are provided by the external evaluation team consisting of UNI's Center for Social and Behavioral Research, ISU's Research Institute for Studies in Education, and UI's Iowa Testing Programs.

- The average proportions of students in 8th and 11th grade meeting mathematics proficiency on the Iowa Assessments **increased slightly across nearly all demographic groups,** including students who are female, African American, Hispanic, and/or with low income, from the period 2011–2013 to the period 2014–2016.
- In science achievement, the average percentages of proficient students in the 2014–2016 biennium period are **higher than the 2011–2013 biennium period** among 8th grade students.
- **More than 75% of all students statewide** indicated they were very interested or somewhat interested in science, technology, engineering, or in pursuing a STEM career in 2016–2017.
- In 2016, Iowa's average ACT score was 21.4 in mathematics and 22.3 in science, compared to 20.6 and 20.8 nationwide, respectively. **Average Iowa STEM score of 22.1 compared to 20.9 nationally.**
- The proportion of 2016 ACT test-takers interested in STEM increased by +3 percentage points among both males and females, and **+2 percentage points among students who are African-American and Hispanic**, compared to 2012.
- From 2012 to 2016, the number of students taking advanced placement courses in STEM–related subjects **increased from 4,968 to 6,537** (32% increase).
- There has been a 3% increase in STEM awards at Iowa's 2–year community colleges, an **18% increase at 4–year public, and a 7% increase at 4–year private (not–for-profit) colleges** and universities, respectively between the periods 2011–2012 to 2014–2015.
- There has been an **18% increase in STEM degrees awarded to females** at Iowa's 2–year community colleges, while the number of degrees awarded to males remained relatively stable between the periods 2011–2012 to 2014–2015.
- The number of **STEM-related degrees awarded to students who are African-American rose 16%** at 4–year public, and 94% at private, 4–year not–for-profit colleges and universities in Iowa since 2011–2012 maintaining stable at 2-4% of all degrees per year. Roughly the same proportions bear out for students who are Hispanic.
- **Iowa STEM occupations, at 17% of all Iowa jobs, are expected to grow 1.2% annually** from 2014 to 2024 compared to .9% annual growth across all occupations.
- These jobs pay mean salaries **$15,514 higher per year** ($57,357 in STEM versus $41,843 for all other).
- In 2015–2016, there were an estimated **12,444 vacancies in STEM jobs statewide**.
- Community college STEM diplomas, certificates and degrees to minority graduates increased 23% last year, **a 144% gain since 2011**.

STEM SCALE-UP 2016-17

A total of **1,674 educators** took part in scaling one of eleven world-class STEM programs in 2016–2017.

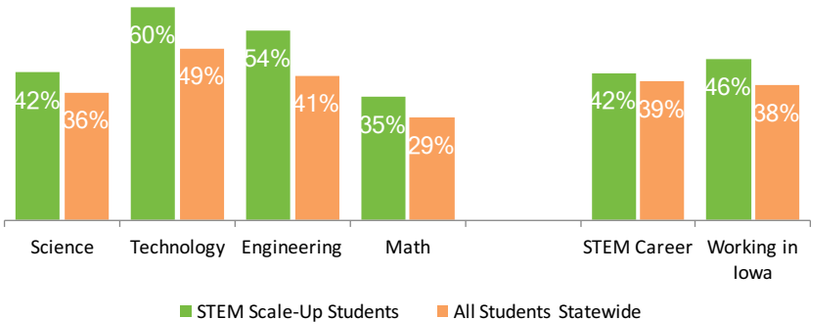
An estimated **74,038 preK–12 youth** participated in one or more Scale-Up programs in 2016–2017.

Since 2012, an estimated **462,778 preK–12 Iowans** have participated in Scale-Up.

70% of educators taking part in Scale-Up agreed or strongly agreed that they now have more confidence to teach STEM topics, and **74%** have increased their STEM knowledge.

Students who participated in Scale-Up were more interested in STEM subjects, STEM careers and working in Iowa after graduation than students statewide.

STUDENT INTEREST IN STEM

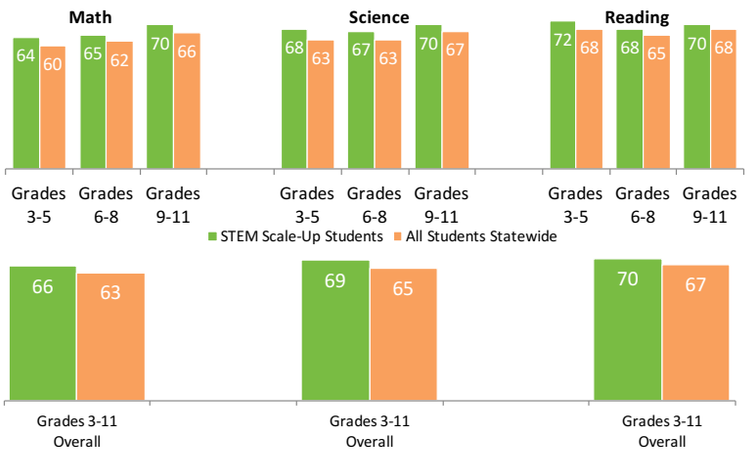


A higher proportion of students who participated in a Scale-Up Program said they were **"very interested" in all STEM-subjects** and in pursuing a STEM career compared to all students statewide.

STUDENT ACHIEVEMENT IN NATIONAL PERCENTILE RANK

STEM Scale-Up participants scored an average of 3 points higher in National Percentile Rank in math and reading, and 4 points higher in science, compared to all students statewide.

For minority students, the difference is greater: Scale-Up participants scored an average of 6 points higher in National Percentile Rank in math, 7 points higher in science and 6 points higher in reading compared to minority students who did not participate.

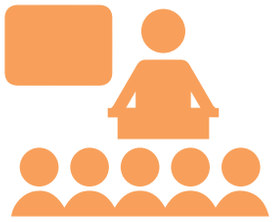


STEM BEST®

BUSINESSES ENGAGING STUDENTS & TEACHERS

Ten new STEM BEST partnerships were established in 2016–2017, involving 17 schools partnering with hundreds of employers.

Estimated dollars contributed by non-school partners collectively sums to more than **$1 million.**



Approximately **700** students participate in STEM BEST.

STEM BEST EXAMPLES

HOOVER HIGH SCHOOL: 92.5% of the 2016–17 STEM class are committed to post-secondary education, many on scholarship.

FORT MADISON HIGH SCHOOL: Students skype experts in a variety of fields across the United States and in several countries abroad, as part of independent studies ranging from developing gaming software, "how-to" online instructions for those who are preparing for surgery and repurposing old computers.

WAUKEE APEX: Past student participants have indicated the top takeaways of this program include growth in persistence, resilience, self-confidence, development of job-seeking package, networking skills and knowledge about future opportunities.

IT ACADEMY

A total of **6,846** Microsoft IT student certifications have been awarded. **(Totaled 607 in 2014, 1,922 in 2015, 2,492 in 2016)**

6 students this year earned Master Certifications (the top certification available in the program).

17 students qualified for Nationals in Word, Excel and PowerPoint (up from 6 last year).

150 high schools and community colleges are participating with 18 schools on the waiting list.

Teacher training for coding and computer science is rolling out, and new student certifications will be coming online for data science and IT Infrastructure as well as for coding and computer science.

TEACHER EXTERNSHIPS

IOWA STEM TEACHER EXTERNSHIPS
CONNECTING CLASS TO CAREER

Total Teacher Externships
2009 to 2017
421

Total Workplace Partners
2009 to 2017
134

Total approximate cost-share by workplace hosts from 2009 to 2017
$585,100
($171,050 this year)

2017 RESULTS:

Of 2017 employers surveyed, most monetized the value of an extern between $2,500 and $10,000.

Of 2017 employers surveyed, most cited as most valued outcomes:

- Elevated awareness of their business in the community
- Increased interest of the future workforce
- Establishment of school-business partnerships
- Workplace relevance brought to schools

Top reasons that 2017 teachers gave for participating include:

- Bringing real-world experiences into the classroom
- Building partnerships with employers
- Discovery of the “soft skills” students will need to succeed

STEM CHALLENGES AND OPPORTUNITIES

- In science achievement, the average percentage of proficient students in the 2014–2016 biennium period are lower than the 2011–2013 biennium period among 11th grade students.
- Proficiency in science on the Iowa Assessments has declined the most among students in the 11th grade who are African-American, from 60% in 2011–2013 to 49% in 2014–2016.
- ACT scores are an average of 5 points lower among students who are African-American, and an average of 3 points lower among students who are Hispanic, compared to their white counterparts.
- 2016 STEM career interests remain strongly gendered, with the top five two-year college majors for females in health–related fields (nursing, radiologic technology and physical therapy), animal sciences and veterinary medicine (pre–vet), while for males the top five majors were computer science and programming, mechanical engineering, computer software/media application, animal sciences and athletic training.
- The proportion of African-American, Hispanic and Asian students who are very interested in STEM careers is higher than the interest among white students in grades 3 and 4. Interest declines by 8% for white students through grade 11, while interest declines by 19% for African-American students and by 16% for Hispanic students.

STEM ENDORSEMENTS

Iowa's STEM teaching endorsements are now offered at five institutions: Drake University, Grand View University, Morningside College, St. Ambrose University and Buena Vista University. A number of other institutions are developing courses in preparation to offer the endorsement.

A total of 34 Iowa educators are now credentialed in STEM.

STEM PROFESSIONAL DEVELOPMENT*

The first-ever STEM Professional Development Palooza was offered to Iowa educators and teacher-preparers in July of 2017 at Waukee's Innovation and Learning Center.

Exemplary models for establishing school-business partnerships and STEM were showcased, each identified through a statewide competitive review process to find the best of Iowa.

"There's been a shift in my thinking."

"I'm chock-full of excitement!"

"My head is spinning, but in a good way."

"Life-changing."

78% of the participants said they would attend another STEM P.D. Palooza.

Beyond the Palooza, **78 different workshops across** Iowa's six STEM regions prepared almost **2,000 educators** to implement 11 Scale-Up programs in 2016–2017.

*Iowa STEM Professional Development "STEM Palooza" Evaluation, Dr. Liz Hollingworth, Director, University of Iowa Center for Evaluation and Assessment. August 31, 2017.

STEM COMMUNICATIONS

SOCIAL MEDIA

Twitter: **2,780** followers
Up **22%** from last year

Facebook: **965** likes
Up **25%** from last year

Instagram: **185** followers
Up **27%** from last year

YouTube: **19,692** views
Up **66%** from last year

Newsletter: **6,321** readers
Up **50%** from last year

Other social media includes Pinterest and LinkedIn.

WEBSITE

www.IowaSTEM.gov

125,418 page views

28,243 new visitors

129 countries

50 states

421 Iowa cities

MEDIA COVERAGE

The STEM Career Awareness TV PSA ran more than **18,000** times across the state, generating **$555,000+** in value for commercial advertisement.

STEM career awareness billboards were placed in **18** rural and urban locations across Iowa, resulting in nearly five million impressions and more than **$23,000** in donated billboard space.

Total PR efforts resulted in **390** pieces of newspaper, television and radio outreach over the course of the year in local, statewide and national media coverage, appearing before **130 million** sets of eyes.

62% of media coverage included a specific STEM example/story in the state or spoke to STEM economic development, and **64%** of the coverage mentions the efforts of the Governor's STEM Advisory Council.

PUBLIC ATTITUDES AND AWARENESS OF STEM

More than half of Iowans (53%) had heard about 'improving math, technology, science and engineering education, and 49% had heard of STEM when used as a stand-alone acronym.

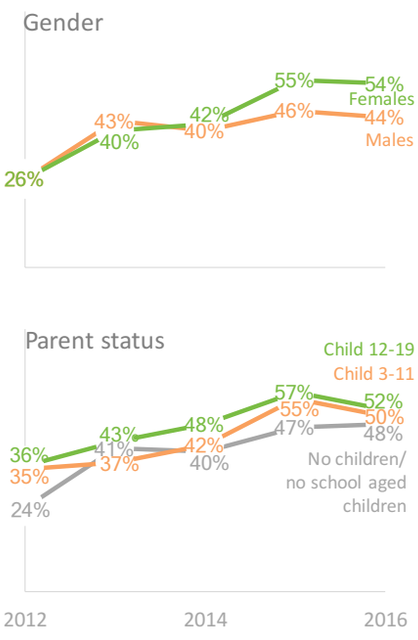
About half of Iowans see STEM as an economic development effort and half see STEM as an education effort.

Nearly 9 out of 10 Iowans agreed or strongly agreed with the statement that there is an urgent need in Iowa for more resources to be put toward STEM education.

92% of Iowans agreed or strongly agreed that increased focus on STEM education in Iowa will improve the state economy.

In 2016, 9 out of 10 Iowans thought STEM education should be a priority in their local school districts, but only 50% said it was a priority and another 20% didn't know.

Awareness of STEM has increased across all subgroups from 2012 to 2016.



IOWA'S STEM NETWORK

CORPORATE PARTNERS AND INVESTMENTS

$3.1 MIL

A total of **$3,169,738** in grants, corporate partner gifts and cost-sharing by other STEM partners was invested in Iowa STEM for 2016–2017.

$569K

44 corporate partners contributed **$569,727** to Iowa STEM in 2016–2017, a slight increase in private investments over 2015–2016. [Investors are listed at www.IowaSTEM.gov/corporate-partners.]

$959K

A total of **$959,984** in grants from the Iowa Department of Natural Resources, the National Governor's Association, the U.S. Department of Labor/Iowa Workforce Development and the National Science Foundation supported Iowa STEM in 2016–2017.

$1.6 MIL

Cost-sharing partners, including Strategic America, Regional Hub institutions, Teacher Externship workplace hosts, STEM BEST partners, and STEM Scale-Up program providers contributed **$1,640,027** to Iowa STEM in 2016–2017.

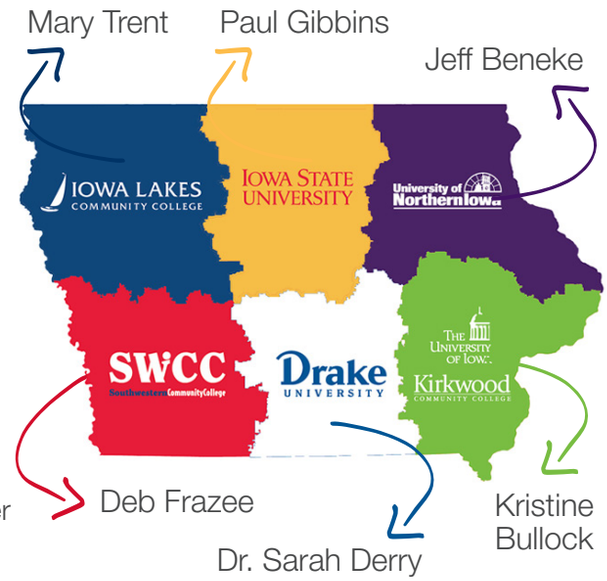
REGIONAL STEM

Regional STEM managers facilitated **11 exemplary STEM Scale-Up programs** that impacted **74,038 preK–12 youth** and their **1,674 educators** in 2016–2017.

Managers held a total of **37 community STEM Festivals** across Iowa, engaging about **16,725 Iowans** in 2016–2017.

Managers made a total of **569 new connections** with business, workforce development, economic development and formal/informal education leaders.

Collectively, Iowa's Regional STEM managers have **9,923** newsletter subscribers, **3,146** Twitter followers and **1,095** Facebook likes.



ACTIVE LEARNING COMMUNITY

337 Iowans representing 200 organizations now make up the STEM Active Learning Community Partners working group (Up from 280 and 140 last year, respectively).

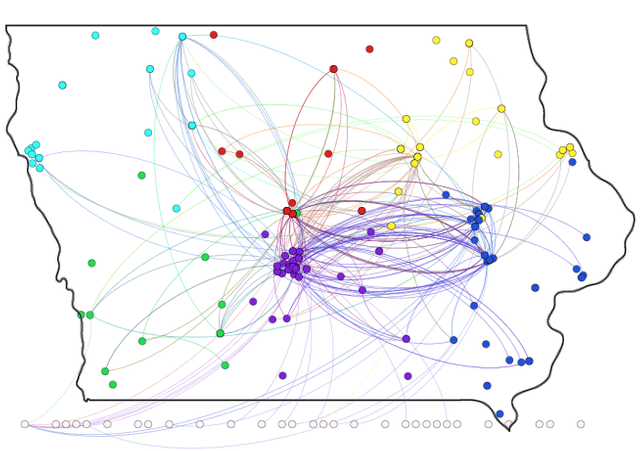
Partners include **after-school programs, museums, libraries, 4H, YMCAs** and other educators around the state.

87 STEM Scale-Up programs were awarded to Active Learning Community Partners in 2016–2017.

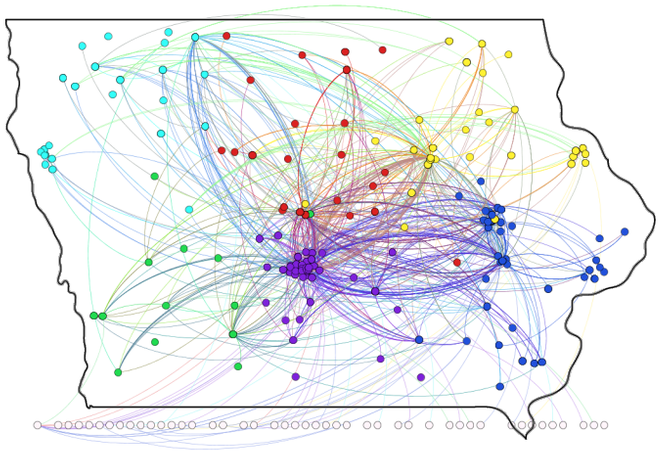
389 educators enjoyed professional development through the ALCP working group in 2016–2017 (up from 272 in 2015).

These **educator partners contributed** to regional STEM festivals, STEM Day at the Iowa State Fair, STEM Day at the Capitol, Dimensions of Success (DoS) trainings, and a slew of conferences in 2016-2017.

IOWA STEM PROFESSIONAL NETWORK GROWTH



2007–2011



2014–2015

The number of members of Iowa's STEM network grew **from 353 in the period 2007–2011 to 721 in 2014–2015**. And the connections between members grew **from 309 to 1057,** respectively.*

*Iowa Statewide STEM Initiative Process Evaluation—Social Network Analysis—Iowa's STEM Network: Reach, Growth, and Potential. Mari Kemis, Andres Lazaro Lopez, Elena Polush, Kathleen Gillon, Research Institute for Studies in Education, Iowa State University. National Science Foundation MSP-RETA award no. DRL-1238211

WHERE ARE THEY NOW?*

STEM evaluators have begun to examine K–12 participants' post-secondary pathways. This will become a prominent report component in years to come.

For a pilot study, a pool of 1,421 high school graduates who had participated in STEM Scale-Up were identified thanks to superintendent permissions.

A total of 168 of them responded to a survey. Sixty percent of that pool (100) were enrolled full time in college. Seventy-one of them declared a STEM major—more than four times the national percentage.

The most agreed-upon survey item was **"I would recommend the STEM program that I was in to other students if they are unsure about their career goals."**

The top three words chosen by respondents to describe their STEM experience were **Challenging, Collaborative and Engaging.**

*Iowa STEM Council Scale-Up Program Participants' Postsecondary Trajectory, Dr. Liz Hollingworth, Director, University of Iowa Center for Evaluation and Assessment. June 30, 2017.